PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: Distribution

Date: December 6, 1991

From: S. E. Clark

Subject: NEW PRIMARY PROCESS - SCHEDULE

Attached is a schedule for the New Primary Process which is focused on obtaining a basis for design by the end of 1992.

Included in the time-line are major areas of responsibility and major activities required to achieve the objective. Please use this information for your planning. Give me a call if there are any questions.

Distribution
R&D Directors
R&D Managers
A. C. Lilly, Jr.
W. E. Poorbaugh
G. B. Reid
H. L. Spielberg
W. P. Taylor

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NEW PRIMARY PROCESS

Task Name	Durati (Days)	Start	Finish
DIRECT CYLINDER CONDITIONER	186	5-Dec-91	31-Aug-92
ORDER DCC	17	5-Dec-91	31-Dec-91
DCC FABRICATION	49	2-Jan-92	6-Mar-92
INSTALLATION	7	6-Mar-92	16-Mar-92
QUALIFICATION	12	16-Mar-92	31-Mar-92
TESTING	40	4-May-92	30-Jun-92
SEPARATOR AIR LEG	33	16-Jul-92	31-Aug-92
CUTTING OPTIMIZATION	201	2-Jan-92	16-Oct-92
RELOCATE CUTTER & STM. TUNNEL	21	3-Feb-92	28-Feb-92
INSTALL NEW FORCE FEED SYSTEM	21	3-Feb-92	28-Feb-92
FACTORIAL TESTS ON EACH COMP.	42	2-Mar-92	30-Apr-92
FUNDAMENTAL STUDIES	65	3-Jan-92	31-Mar-92
PURCHASE HEATER	22	2-Jan-92	31-Jan-92
INSTALL HEATER	18	4-May-92	29-May-92
FACTORIAL TESTS	44	1-Jun-92	31-Jul-92
COMAS CUTTING HEAD TESTING	43	17-Aug-92	16-Oct-92
BURLEY PROCESS	250	2-Jan-92	30-Dec-92
FUNDEMENTAL STUDY COMPLETE	148	2-Jan-92	31-Jul-92
BS,CURRENT PROCESS CHEMISTRY	148	2-Jan-92	31-Jul-92
CASED CUTTING	85	1-Jul-92	30-Oct-92
CASED CUT DRYING	102	3-Aug-92	30-Dec-92
COMP. DRYING (ST. TUN,ROT.DRY)	268	4-Dec-91	30-Dec-92
PURCHASE DRYER	17	4-Dec-91	30-Dec-91
COMPONENT TESTING (S/W HAUNI)	66	6-Jan-92	2-Apr-92
DRYER INSTALLATION	20	1-Sep-92	30-Sep-92
COMPONENT TEST CONFIRMITY	22	1-Oct-92	30-Oct-92
PROCESS INTEGRATION TESTING	39	2-Nov-92	30-Dec-92
MAKER FEEDER EQUIPMENT	249	6-Jan-92	31-Dec-92
CONCEPT DEVELOPMENT	124	6-Jan-92	30-Jun-92
PROTOTYPE DEVELOPMENT	125	2-Mar-92	31-Aug-92
PROTOTYPE EVALUATION	125	1-Jul-92	31-Dec-92
MAKER DEVELOPMENT	250	2-Jan-92	30-Dec-92
EQUIPMENT FUNDING FOR PROTOS	22	2-Jan-92	31-Jan-92
PROTOS 9000 DESIGN	126	2-Jan-92	30-Jun-92
PROTOS 8000 INSTALL (PARK-II)	21	1-Jul-92	30-Jul-92
EVAL. OF MAKER W/BASE FILLER	21	3-Aug-92	31-Aug-92
NEW HOPPER EVALUATION	21	3-Aug-92	31-Aug-92
SYSTEM EVALUATION	81	1-Sep-92	30-Dec-92
MK-9 HOPPER	126	2-Jan-92	30-Jun-92
COMPLETE S/W EVALUATION	66	2-Jan-92	31-Mar-92
EVALUATE IN FACTORY	60	1-Apr-92	30-Jun-92
PROTOS HOPPER	211	2-Jan-92	30-Oct-92

ENGR. DEVELOPMENT	126	2-Jan-92	30-Jun-92
PROTOTYPE DELIVERY	63	1-Jun-92	27-Aug-92
PROTOTYPE EVALUATION	63	3-Aug-92	30-Oct-92
MATERIAL HANDLING & BLENDING	251	2-Jan-92	31-Dec-92
VERIFY BLEND EQ. TO TOT. BLEND	43	2-Jan-92	28-Feb-92
MODEL FOR CABARRUS FAC. - OPT.	43	2-Jan-92	28-Feb-92
CONCEPT ALTER. & VENDOR SURVEY	42	3-Feb-92	27-Mar-92
PROTOTYPE PURCHASE	20	1-Apr-92	30-Apr-92
PROTOTYPE INSTALLATION	21	3-Aug-92	31-Aug-92
EVALUATION/MODIFICATIONS	82	1-Sep-92	31-Dec-92
SUBJECTIVE MAPPING	251	2-Jan-92	31-Dec-92
COMPONENT MAPPING	169	2-Jan-92	31-Aug-92
BLENDED CIG. EVAL. AND ADJUST.	82	1-Sep-92	31-Dec-92
CIGARETTE DESIGN	251	2-Jan-92	31-Dec-92
PARTICIPATE IN TASTE EVAL.	189	2-Jan-92	30-Sep-92
CON. ADJ. FOR CONST. DELIVERY	189	2-Jan-92	30-Sep-92
CON. ADJ. FOR PRODUCT TARGETS	82	1-Sep-92	31-Dec-92
ADVANCED CONTROLS	269	4-Dec-91	31-Dec-92
UPGRADE SCOPE DEV.& SENSOR ID.	61	4-Dec-91	28-Feb-92
SPEC. CHEM. SENSOR HRDWRE. ID.	125	3-Jan-92	30-Jun-92
C.M. WEIGHT CONTROL DESIGN	125	3-Jan-92	30-Jun-92
OPTIMIZATION OF CONTROL STRAT.	125	1-Jul-92	31-Dec-92
BUSINESS ANALYSIS	149	2-Jan-92	3-Aug-92
ACCESS CABARRUS STATUS BUDGET	20	2-Jan-92	29-Jan-92
UPGRADE MODEL FOR EACH PRIMARY	43	2-Jan-92	28-Feb-92
OPTIMIZE RETROFIT POTENTIALS	86	2-Jan-92	30-Apr-92
INTEG. RETROFIT W/ PROD. PLAN.	20	1-Apr-92	30-Apr-92
ESTABLISH GLOBAL USA PLAN	60	1-Apr-92	30-Jun-92
EST. COST & IMPROV. PLAN	45	1-Jun-92	3-Aug-92
FLAVOR/HUMECTANT REALLOCATION	250	2-Jan-92	30-Dec-92
UNIT OP. OBSERV. & SUBJ. MAPP.	126	2-Jan-92	30-Jun-92
FLAVOR TRANSFER,DETER. OF IMP.	104	2-Jan-92	29-May-92
FLAV. TO COMP. RATIO ANALYSIS	125	2-Mar-92	31-Aug-92
FLAVOR SYSTEM OPTIMIZATION	81	1-Sep-92	30-Dec-92
SEMI-WORKS RECONFIGURATION	207	4-Dec-91	30-Sep-92
DEVELOP 650,APPROV. FOR SEED $	17	4-Dec-91	30-Dec-91
OBTAIN APPROVAL FOR 650	43	2-Jan-92	28-Feb-92
ACCELERATED EQUIPMENT PROCURE.	18	4-Dec-91	31-Dec-91
COMPLETE DESIGN	43	2-Jan-92	28-Feb-92
COMPLETE CONSTRUCTION	189	2-Jan-92	30-Sep-92

Element Description: Direct Cylinder Conditioner

Concept: Individual components are opened, moistened to 16 ± 2% O.V., beetle kill is achieved, and base flavors are applied. Base flavors are primarily humectants.

Scope: Utilize the work done by Engineering at Cabarrus to establish beetle kill conditions, exit temperature, and OV targets for each component. Purchase and install DCC in Semiworks.

Verify the conditions necessary for beetle kill - not subjective parity with the total blend process. If they are different, establish the chemical differences as a function of process conditions.

Develop flavor application and control system for base flavors. Focus will be Bright, Oriental and Burley with and without subsequent Burley Spray process.

Separator evaluation in conjunction with Engineering's work as well as scheme for incorporating contaminant removal down stream of DCC.

Schedule:

Order DCC	12/91
DCC Fabrication	3/92
Install/Start-up	3/92
Qualification	3/92
Testing	4/92-6/92
Separator Air Leg	7/92

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Element Description: Cutting Optimization

Concept: Individual Blend Components will be cut at moderate OV's (~15%) and elevated temperature to achieve optimal cut quality, size distribution as well as optimal cut width and strand length.

Scope: Given the expected temperature/OV history of each component prior to the cutting process, establish the cutter operating conditions for the optimal temperature/OV cutting envelope.

Establish techniques for width and length control. Evaluate Comus cutting drum.

Late in the program optimize width and length for survivability and CM performance with existing maker hopper as well as planned improvements.

Schedule:

Fundamental Studies	1/92-3/92
Purchase heater	1/92
Install new Forced Feed System	2/92
Relocate existing cutter (RC3) and steam tunnel To the Semiworks from DPP	2/92
Factorial tests on each component	3/92-4/92
Install heater	5/92
Factorial tests	6/92-8/92
Comus Cutting Head Testing	8/92-10/92

Element Description: Burley Process

Concept: Burley Spray (current formula or cooked B.S.) is applied to strip, the strip is cut, additional flavors may be added, and then dried in a non-P&S apron dryer.

Scope: Establish the basics of the Burley Spray reaction for the existing process. Questions such as:

- Is there reaction actually between the B.S. and the Burley or a reaction of B.S. at the temperature in the dryer?
- Can the necessary reaction products be "cooked" and then applied to the strip?

Establish strip preparation conditions for B.S. application, e.g. is steam tunnel opening necessary. Does pre-moistening provide any advantage to flavor system performance?.

Spray application - Is strip opening and moistening prior to spray application in a rotary cylinder beneficial? What technique other than a rotary cylinder will provide improved flavor application and adequate control.

Verify that a rotary dryer after casing and cutting will accomplish the required heat treatment and drying for this process. Would other dryer designs or energy sources be more effective?

Schedule:

Fundamental Study Complete B.S., Current Process Chemistry,	1/92-7/92
Cased Cutting	8/92-10/92
Cased Cut Drying	8/92-12/92

Element Description: Component Drying - (Steam Tunnel and Rotary Dryer)

Concept: After passing thru a steaming tunnel Bright, Oriental and Burley cut fillers are dried in a rotary dryer. This process enhances CV by a combination of mechanisms.

SCI will be evaluated as a partial expansion and setting operation for the NPP within the NET Program.

RL may benefit from a similar process. BL will not require this process step.

Does the Hauni Tunnel offer any positive contribution to the CV enhancement or negative impact on sieve distribution exit the dryer?

Scope: Approximate temperature/OV/time variables for each component prior to steam tunnel.

Evaluate physical property performance for each component at a range of inlet OV's with and without the steam tunnel.

Schedule:		
	Purchase Dryer	12/91
	Component testing	
	Semiwork's Hauni	1/92-4/92
	Dryer Installation	9/92
	Component Test Confirmation	10/92
	Process Integration Testing	11/92-12/92

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Element Description: Maker Feeder Equipment

Concept: The new hoppers will be fed from above by a non-pneumatic delivery system developed in this project. The delivery system will be of two basic designs - one for a facility where tobacco storage is above the maker and the second is for a facility where tobacco is on level with or below the maker.

Scope: In coordination with the Material Handling and Maker Development devise the container unloading mechanism that is close coupled to a maker where the storage area is above the maker. In a facility where storage is on level with or below the maker devise non-pneumatic delivery and distribution system.

Schedule:		
	Concept Development	1/92-6/92
	Prototype Development	3/92-8/92
	Prototype Evaluation	7/92-12/92

Element Description: Maker Development

Concept: Focal point will be Protos 8000 per York Rebuild Standard. This will include the improvements associated with the PARK-II project.

For the NPP the emphasis will include design changes which emphasize uniformity of cigarette physical properties for the new primary filler. Coordination of this effort is required between Cigarette Design and the unit operation work within the NPP to optimize filler and component size distribution, strand dimensions, and cigarette firmness and weight reduction potential.

This element will also develop and qualify maker hoppers for the Mark-9's and Protos 8000 making machines.

Scope: Engineering will utilize the Protos-9000 for initial development work on the suction tape garniture transition as well as weight control schemes. This will continue thru June of 1992.

Funds will be obtained to purchase and install a Protos from York with PARK-II enhancements as appropriate in the Semiworks by July 1992.

Coordinated design modifications, cigarettes design changes and unit operation optimization will continue thru 1992 to maximize maker performance at maximum weight reduction.

Schedule:

Equipment funding for Protos	1/92
Protos 9000 design	1/92-6/92
Protos 8000 installation (PARK-II)	7/92
Evaluation of Maker with base filler	8/92
New Hopper evaluation	8/92
System optimization	9/92-12/92
MK-9 Hopper	
Complete S. W. evaluation	1/92-3/92
Evaluate in factory	4/92-6/92
Protos Hopper	
Engr. Development	1/92-6/92
Prototype Delivery	6/92-8/92
Prototype Evaluation	8/92-10/92

Element Description: Material Handling and Blending

Concept: Individual components will be processed and stored as cut components. The components will be fed in proper ratio for a blend, aftercut applied and blended in a silo. Finished filler will be withdrawn from the silo and placed in small (500-1000#) containers which are delivered to individual makers on an as demand basis.

The concept must be modeled to optimize both component storage and cut filler storage.

Scope: Verify the blending concept provides equivalent and/or improved blend uniformity compared to the current total blend process. Develop gentle flow splitting and mixing devices for transport system if the blending operation following AC application is not adequate.

Identify and evaluate storage system devices. In conjunction with cigarette design, subjectives and maker development efforts establish filler hold time requirements.

Minimize filler degradation within process.

Support retrofit concept evaluations.

Schedule:

Verify blend equivalency to Total Blend Process	1/92-2/92
Model for Cabarrus Facility - optimization	1/92-2/92
Concept alternatives and Vendor Surveys	2/92-3/92
Prototype Purchase	4/92
Prototype Installation	8/92
Evaluation/Modification	9/92-12/92

Element Description: Subjective Mapping

Concept: Process variables such as temperature, OV, time and flavor systems interact to impact taste. By altering controllable variables component and blend taste can be altered.

Scope: Throughout the program components processed at different process conditions will be evaluated with respect to a selected list of attributes.

Based on the mapping of taste response to variables, provide directional input to the unit operations efforts which will be used to adjust component contribution to the taste of the blended cigarette.

Close coordination with cigarette design and the flavor effort will be required.

The impact of flavor transfer within the total blend process and its relationship to the component processed filler will also be investigated.

Schedule:		
	Component mapping	1/92-8/92
	Blended cigarettes evaluations and adjustments	9/92-12/92

Element Description: Cigarette Design

Concept: The NPP will produce filler which can have its taste altered, will utilize NET or DIET, and be of controlled strand size.

Scope: Develop construction specifications which complement filler, taste and delivery characteristics to produce a cigarette equivalent to existing products.

Schedule:		
	Participation taste evaluations of component testing	1/92-9/92
	Construction adjustments for constant	1/92-9/92
	delivery at reduced weight	1/92-9/92
	Construction adjustments for product targets	9/92-12/92

Element Description: Advanced Controls

Concept: The NPP will utilize a simplified process equipment scheme which will have a significant dependence upon product sensors, ratio controls in feed forward and feed back modes. New sensors will be evaluated/developed to meet these needs. The use of dynamic system tuning will be required. Advanced control concepts utilizing technologies such as AI, Fuzzy Logic, Neural network.

Scope: Develop basic control philosoply, hardware requirements and software strategy for the blend integration of NPP for the initial Semiworks upgrade.

Identify sensor hardware which detects chemical characteristics of components as processed. Identify sensors appropriate for unit operations to be developed in the NPP with respect to the scale of the Semiworks and temp, humidity, etc.

Schedule:

Upgrade scope development and sensor identification and design	12/91-2/92
Specialty chemical sensor hardware identification	1/92-6/92
C.M. weight control design	1/92-6/92
Optimization of control strategies	7/92-12/92

Element Description: Business Analysis

Concept: The Cabarrus Expansion will utilize the NPP to achieve product and flexibility advantages.

Segments of the NPP can be incorporated into existing facilities on a cost justified basis.

The economic advantages for each facility will determine the extent to which elements of the NPP is incorporated into the facility.

Scope: Assess the current design and procurement position on the Cabarrus project relative to the NPP. Establish design change and cancellation charge budget. Exercise model for Cabarrus operation as well as other primaries to establish potential benefit from redesign/retrofit.

Assess retrofit potential as a function of existing facility and facility modification. Coordinate planning with input from Production planning scheduling.

Evaluate alternative C.M. operating configurations which complement the cut filler delivery system.

Does the relocation of DIET to Bermuda from the MC, offer an opportunity to increase the MC capacity and supply Stockton Street with filler? How will export cut filler be handled if Stockton Street Primary is shut down? What are economics?

Based on economics develop implementation schedule and cost estimate for capital work.

Schedule:

Assess Cabarrus Status/Budget	1/92
Upgrade Model for each primary	1/92-2/92
Optimize retrofit potentials	1/92-4/92
Integrate retrofit with Production Planning	4/92
Establish Global US Plan	4/92-6/92
Establish cost and implementation plan	6/92-8/92

Element Description: Flavor/Humectant Reallocation

Concept: A base flavoring is added to Bright, Oriental and possibly Burley in the DCC. Brand specific Flavorings are added in Aftercut.

Flavor system design will attempt to minimize VOC emissions as well as ambient VOC's.

The flavor transfer issue will be evaluated and become an additional guideline for reallocation.

Scope: Participate with Unit Operations and Subjective mapping effort to gain understanding of the NPP.

With Subjective effort, establish the technical basis for flavor carriers to the cigarettes e.g. Is it important which component carries flavor to the cigarette or is it sufficient for the flavor to be on some component or components.

The ratio of flavor to component may need to be increased to maintain subjectives of the cigarette at reduced weight.

Schedule:

Unit Operations and Subjective Mapping	1/92-6/92
Flavor transfer, determination of importance	1/92-5/92
Flavor to component ratio analysis	3/92-8/92
Flavor system optimization	9/92-12/92

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Element Description: Semiworks Reconfiguration

Concept: The Semiworks will be reconfigured and operational for testing of the NPP line configuration while maintaining total blend capability by the end of the third quarter in 1992.

Schedule:		
	Develop 650, obtain approval for seed money	12/91
	Accelerated equipment procurement	12/91
	Obtain approval for 650	1/92-2/92
	Complete design	1/92-2/92
	Complete construction	1/92-9/92